

# *Settler's Guide*

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## **Handbook of Information**

===== FOR =====

**SETTLERS IN THE CANADIAN PACIFIC  
RAILWAY IRRIGATION BLOCK**



*The Canadian Pacific Railway  
Colonization Department  
Calgary, Alta., Canada*

1908

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# Settlers' Guide



This booklet is intended solely for the use of those who have purchased lands within the Canadian Pacific Railway Company's Irrigation Block with the intention of making their homes there. As a rule, when a corporation has sold a new settler a farm, its interest in the transaction immediately ceases except in so far as deferred payments are concerned. The Canadian Pacific Railway Company being essentially neither a "water selling" nor a "land selling" concern is, however, in an entirely different position. With the sale of the land, the Company's real interest in the land practically only commences. This Company sells its lands at a low figure and supplies water for irrigation at the barest cost. It is not, by any means, actuated by philanthropic motives in so doing. The Company has undertaken the colonization and development of the Three Million Acre Irrigation Block almost solely with a view to creating the greatest possible amount of railway traffic on this area, which, it is a well known fact is invariably the result of colonization on irrigated land.

The Company's handbook dealing with the Irrigation Block, bears on the front page the following sentence:—

"The future home of the most closely settled and prosperous  
"mixed farming, stock raising, and dairying community in Western  
"Canada."

Unless these conditions are actually brought about, the Company's aim will not be fulfilled. The mere sale of the land is only a means to the end—the successful settler is the end the Company strives to attain.

The object of this booklet is to extend to new settlers, unacquainted with our institutions and our climatic and soil conditions, a few hints which, if followed, may probably save them considerable disappointment, and may be the means of leading them into successful farming earlier than would otherwise be the case.

## Customs and Quarantine Regulations.

Settlers from the United States are interested in the conditions upon which they are able to enter their farm outfits and household furniture into Canada free of duty. A settler is allowed to bring in, duty free, wearing apparel, also household goods and farm machinery that has been in use at least six months, one head each of horses or cattle for each 10 acres of land purchased or otherwise secured up to 160 acres, and one head of sheep for

each acre. Customs duty paid on animals imported in excess of this proportion will be refunded for the number applicable to an additional holding of 160 acres when secured.

Settlers' cattle, when accompanied by certificate of health, are admitted without detention; when not so accompanied they must be inspected. Inspectors may subject any animal showing outward signs of tuberculosis to the tuberculin test before allowing them to enter. Don't start with cattle in weak or poor condition, particularly if they suffer from severe colds. Any cattle found to be tuberculosis may be returned to the United States or killed without indemnity.

Sheep for breeding or feeding purposes may be admitted by a certificate of inspection at port of entry, and must be accompanied by certificate signed by a Government inspector, in the district from whence the animal originated, to the effect that sheep scab has not existed in the district in which they have been feeding for six months preceding the date of importation.

Swine may be admitted when forming part of settlers' effects, but only after a quarantine of thirty days at the border, and when accompanied by a certificate that swine plague or hog cholera has not existed in the district whence they came for six months preceding the date of shipment.

It will readily be seen that if a settler has household goods and farming outfit that have been in his possession for six months prior to his removal, it will pay him to ship them to his new home. The same holds good with regard to horses, cattle and sheep. In such cases an inspection certificate should be procured from the local veterinary inspector prior to leaving home. The quarantine regulations regarding swine are such that it would not pay settlers to bring them into Canada; in fact, they are intended to be prohibitive.

Freight rates on settlers' effects from principal points in Western Canada and United States to Calgary:—

#### **Portland, Oregon, via Sumas, B.C.**

Carload lots of 24,000 lbs. . . . .	\$153.60
Less than carload lots . . . . .	1.50 per cwt.

#### **Chicago, via N. Portal, Sask.**

Carload lots of 24,000 lbs. . . . .	\$ 72.00
Less than carload lots . . . . .	.90 per cwt.

#### **Kansas City, via N. Portal, Sask.**

Carload lots of 24,000 lbs. . . . .	\$ 91.20
Less than carload lots . . . . .	1.15 per cwt.

#### **Omaha, via N. Portal, Sask.**

Carload lots of 24,000 lbs. . . . .	\$ 88.80
Less than carload lots . . . . .	.90 per cwt.

#### **St. Paul, via N. Portal, Sask.**

Carload lots of 24,000 lbs. . . . .	\$ 45.00
Less than carload lots . . . . .	.67 per cwt.

### **Denver, via St. Paul and North Portal, Sask.**

Carload lots of 24,000 lbs. . . . .	\$189.60
Less than carload lots . . . . .	2.52 per cwt.

### **New York, via Buffalo.**

Carload lots of 24,000 lbs. . . . .	\$264.00
Less than carload lots . . . . .	1.72 per cwt.

### **Buffalo.**

Carload lots of 24,000 lbs. . . . .	\$156.00
Less than carload lots . . . . .	1.24 per cwt.

### **Quebec.**

Carload lots of 24,000 lbs. . . . .	\$148.80
Less than carload lots . . . . .	1.24 per cwt.

### **Montreal and Toronto.**

Carload lots of 24,000 lbs. . . . .	\$136.80
Less than carload lots . . . . .	1.14 per cwt.

## **School System.**

The Public School system established in the Province of Alberta is well abreast of the times. Its management is vested in one of the Ministers of the Government. The organization of school districts is optional with the settlers. Districts formed cannot exceed five miles in length or breadth, and must contain at least four actual residents and twelve children between the ages of five and sixteen.

The cost of maintaining schools is small, owing to the liberal assistance given by the Government; the public grants paid to each school are from \$250.00 to \$300.00 per year. Each teacher employed must have a certificate of a recognized standard of education, and a thorough system of inspection is inaugurated, each school being visited twice during the year. In the schools of the larger towns, the higher branches of study are taught and pupils are prepared for university matriculation and teachers' certificates.

The law also contains the following provision authorizing the organization of school districts by the Minister of Education in cases where it is considered desirable to do so without any petition from the settlers:—

"In case any portion of the Province not exceeding five miles in length and breadth exclusive of road allowances has not been erected into a school district, the Minister may order the erection of such portion into a District provided that it contains:

- (a) Twenty children between the ages of five and sixteen inclusive.
- (b) Ten persons actually residing therein who on the erection of the district would be liable to assessment.
- (c) Six thousand acres of assessable land; and notice of the erection of any such district shall be published in the official gazette, which notice shall be conclusive evidence that the district has been duly erected and constituted in accordance with the provisions of this ordinance."

## **Taxation.**

As soon as the Canadian Pacific Railway disposes of a parcel of land, the same becomes liable for Local Improvement taxes and also subject to the General Provincial Educational Tax of  $1\frac{1}{4}$  cents per acre until such time as a school district is established embracing said area, when the school taxes are somewhat increased for the support of a local school, but cannot be levied in excess of \$16.00 per quarter section.

Those purchasing land from the Company who do not receive within a year from time of purchase, the usual tax notices should apply to "The Department of Public Works, Edmonton, Alberta," when full information will be sent them.

## **System of Land Survey and Road Allowances.**

The lands in the Irrigation Block are laid off in townships, practically square in form, bounded on the east and west sides by true meridians of longitude and on the north and south by chords of the circular parallels of latitude. The tiers of townships are numbered from one upwards, commencing at the International Boundary, and lie in ranges from east to west, numbered in regular order westward from certain standard lines called "principal meridians." Each township is sub-divided into 36 sections, containing 640 acres, more or less. Each section is in turn divided into four quarter-sections of 160 acres each, which are designated the South-East, the South-West, the North-East and the North-West quarters. Each quarter-section contains four legal sub-divisions of 40 acres each. The corners of each section and the intersection of quarter-section lines with section boundaries, are marked on the ground by suitable posts and mounds, rendering it an easy matter to locate any particular piece of land.

Road allowances are provided running North and South between each section, and East and West along the Northerly boundary of every second tier of sections, commencing from the Southerly boundary of the township.

## **Fencing.**

Figure 1 shows the manner in which line fences should be located. Many costly errors arise by reason of not getting fences on the proper lines, and this diagram should be carefully studied before any boundary fences are erected.

The Company is prepared to fence its main canal, secondary and large distributary canals at such a time as land owners erect their fences to connect with the same.

## **Improvement of Farm Lands.**

This Company maintains a department at its Head Office at Calgary devoted to assisting new settlers to get their farms on a productive basis at the earliest possible moment. It is frequently impossible for a land buyer to go into occupation immediately, and a year or more would be lost to him if facilities were not available for getting preliminary work performed on his new home. Recognizing the advantages that would accrue to our

Position of pits at angles of  
 $\frac{1}{4}$  Sections shown thus ::  
 Fences to West & South boundaries  
 of Sections are to be 66 feet  
 from lines of pits.

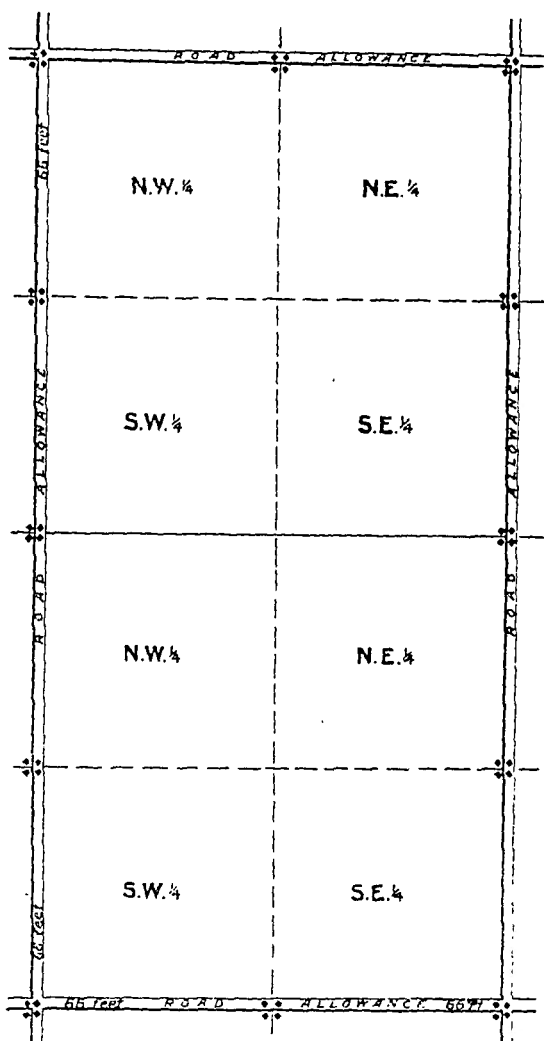


Figure 1.

clients by placing at their disposal the services of an up-to-date "Development Department," such was forthwith provided by the Company.

This department undertakes to contract on behalf of any land purchaser in the Irrigation Block for breaking, discing, harrowing and seeding of the land; also for the purchase of seed grain, and for the erection of fences and, in certain cases, for the construction of necessary buildings. The ruling price for such work is:—

Breaking, 3 inches, \$3.00 per acre.

" 5 inches, \$4.00 per acre.

Discing (each operation), 50c. per acre.

Harrowing (each operation), 25c. to 35c. per acre.

Seeding (not including seed), 50c. per acre.

Fencing, per mile, 3 wires, \$100 to \$125; 4 wires, \$120 to \$140, according to location.

The Company does not wish to enter into the business of Estate Agents and, therefore, makes no charge whatever for its services in behalf of its clients outside of actual expenses incurred. Our efforts are strictly confined to the preliminary farm operations. Harvesting and marketing the crop is not undertaken under any circumstances. Further information and blank forms may be obtained on application to the office at Calgary.

### Demonstration Farms.

Realizing fully the magnitude of the task involved in colonizing the huge area of land embraced in the Irrigation Block and the importance of placing at the settlers' disposal expert advice and assistance, the Company operates at central points farms devoted to demonstrating the agricultural possibilities of the tract. The staff on the Company's Demonstration Farms is always ready to assist new colonists, and on some of the farms are maintained pure-bred bulls and boars of the best breeds for the free use of the settlers. The maintenance of these Demonstration Farms is in line with the general policy of creating successful agricultural conditions throughout the Irrigation Block. It is the duty of our staffs there to lend a helping hand, in any manner that may be possible, and to the advantage of newcomers. Settlers need have no hesitation in applying to our various farm managers for advice and assistance.

### Breaking the Sod.

While opinions vary somewhat as to the proper method of breaking, there is no dispute in regard to the time of the year when that work should be done. The most successful results are obtained by breaking when the prairie grasses are at their best, which is generally between the 15th of May and the first week of July, according to the season. Fall breaking is seldom a success, and invariably results in a greatly reduced crop yield the following year.

A special "breaking" plow with a twelve-inch share should be used. Some advocate breaking as shallow as the nature of the surface will permit of clean work being done, which is usually about three inches, re-plowing in the same direction a little deeper, or "back-setting" as it is termed, about six weeks later, by which time the sod should be well rotted. After

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back-setting a good seed bed may be prepared with a disc harrow, and the land is then ready for seeding.

Many good farmers prefer to break five to six inches in depth, turning the sod well over and afterwards discing thoroughly so as to make a good seed bed. In fact, this practice has been almost exclusively followed in the Irrigation Block and wherever winter wheat is to be seeded on the new land.

It will be well to break no more than can be done properly and worked thoroughly. When land is broken very early in the season, much of the vegetation is not killed, and soon accommodates itself to changed conditions; continuing to grow; while when plowing is done after the growth of grass has advanced a little, most of the herbage will be killed.

The rotting of the sod will be greatly facilitated by rolling immediately after breaking with a heavily weighted roller, in order to pack the soil closely so as to exclude air spaces and retain the moisture which, with heat, is essential to induce the necessary fermentation required to cause the breaking down of the vegetable matter and the mellowing of the soil. Late breaking is apt to dry out too much to allow the vegetable matter to rot, and this is also the result when the sod is set up on edge or in kinks instead of being turned over neatly with the grass side down.

Settlers in the Irrigation Block generally arrange for the breaking of a small area of their farms prior to settlement, so that they may not be delayed in producing results. As previously explained, the Company has made it a practice to undertake to contract for work of that nature as a matter of convenience to our clients.

### Seed Grain.

Investigations covering a number of years have conclusively proved that there is no agricultural loss as considerable as that due to the use of inferior seed grain. Every settler should satisfy himself that his seed grain is clean, well matured, and of the very best variety.

**Seed Selection.**—Commencing when the first crop is ripe, settlers should hand select a number of the best formed and earliest ripening heads of the various grains. Shell these heads carefully and sow them in narrow garden plots the following year. All inferior heads should be removed from those plots, and in that manner the very best and cleanest of seed grain can be developed on every farm within a few years. Those who can afford to do it will be able to purchase seed grain from farmers who have obtained quantities of good seed by following out this method.

**Change of Seed.**—The idea that a change of seed is necessary periodically, is entirely erroneous. If grain "runs out," it is due to shiftless farming and failure to provide a good foundation, and not to any inherent weakness in the seed itself. As a matter of fact, the longer any sample of grain is grown on a farm, the better it should adapt itself to the peculiar conditions of that particular farm and district.

**Seed Testing.**—The Dominion Government has opened a branch office of the Dominion Seed Laboratory at Calgary. The mission of that office is to test free of all charge, samples of seed grain sent in by farmers. Before

you finally purchase seed grain, obtain samples of it and send it to the Laboratory for report.

**Object of Seed Testing.**—The object of testing seeds for farmers and seed merchants is to provide for their own information a summary report giving data in the simplest possible form, showing the qualities of the seeds in respect to (a) purity (the presence of useless and noxious weeds), and (b) the percentage of germinable seeds. The inherited productiveness or quality of the plants or crop which may be produced from seeds cannot be determined in a Seed Laboratory.

**Where to Send Seeds for Testing.**—All kinds of field and garden crop seeds will be tested for purity and vitality, free of charge, to farmers. All samples of seeds for test from the Province of Alberta should be addressed to the "Dominion Department of Agriculture, Seed Laboratory, Calgary." Packages addressed to the Seed Laboratory at Calgary will not be accepted from the post office unless the postage on the samples has been prepaid.

**To Secure Representative Samples for Test.**—In order to insure that the sample sent for analysis accurately represents the bulk from which it is taken, the seed should be well mixed and small quantities taken from different parts to make the sample sent for analysis. If it be impracticable thus to mix the seed, small quantities may be drawn by means of seed tryers from the top, middle and bottom of each bag when there are not more than six bags; from the top, middle and bottom of every second bag when there are seven to twelve bags; and from the top, middle and bottom of every fourth bag when there are more than twelve bags. The small quantities thus drawn may then be well mixed to make the sample for analysis.

**Size of Sample for Ordinary Purity Test.**—The size of sample sent for purity test should not be less than: One ounce of grass seeds of all kinds, or of white and alsike clovers; two ounces of red clover, alfalfa, millet or other seeds of like size; one-half pound of cereal grains or other large seeds.

**Size of Samples for Germination Test Only.**—For germination test only, samples of smaller size will suffice, but in any case these should be not less than approximately 2,000 seeds of grasses and clovers; 1,000 seeds of cereal grains.

If you have not the time to obtain a Government report, you can make a fairly efficient test yourself by counting out 100 grains, placing them between wet flannel on a dinner plate and covering them with another one. This should be kept moist and in a room where the temperature will be about 60 degrees Fahr. This is about the temperature of an ordinary cool living room. At the end of five days count and remove the grains that have sprouted, noting result, and repeat this at the tenth day. You will thus have a fairly accurate indication of the percentage of good seed in your sample.

Grain suitable for seed should test 90 per cent., and when seed of less quality is used a greater quantity must be sown per acre. Grain cut on the green side, as is frequently done to utilize the straw, is generally worthless for seed.

**Clean Seed.**—The "Noxious Weed Act" of the Province provides heavy fines for any person selling seed grain containing seeds of noxious weeds. Sow only clean seed and re-clean the cleanest before sowing. You cannot afford to grow weeds on your land, you need it all for the production of

merchantable crops. And, above all, you cannot afford to introduce troublesome weeds upon your clean farm.

The best investment a farmer can make is undoubtedly an up-to-date fanning mill. Thousands of farms have been seeded down with weeds to such an extent that they have become almost unprofitable to work, simply through failure on the part of the farmer to clean his seed before putting it in the ground.

## Crops and Seeding.

It has been found that a crop from thin sowing usually takes longer to ripen. On irrigated land there cannot be any doubt that fairly heavy sowing should be resorted to, as economy of moisture is not in that case a serious object, and thick sowing will hasten maturity. It has been found that the press drill is by far the best implement for seeding in Southern Alberta.

The Dominion Experimental Farms system has only recently been extended to the Province of Alberta, and there are not, therefore, any conclusive data available in regard to the proper time for seeding each grain and the quantity to use. Certain conclusions have, however, been reached through the actual experience of farmers in the Province covering the past twenty years or more, upon which the following observations are based.

**Spring Wheat.**—Opinions are undivided as to the proper time to sow Spring Wheat. This grain should be seeded as soon as it is possible to cultivate the land in the Spring, and it is not generally a success on Spring-plowed land. It should be sown either on summer-fallowed or fall-plowed land. Quantity per acre, one and a half bushels on non-irrigated and one and three-quarters on irrigated land.

**Winter Wheat.**—This crop has not been produced in Southern Alberta long enough to form any very definite conclusions in regard to the proper time of seeding. The best farmers endeavor to have their seeding done during the last two weeks of the month of July. It is good practice to put the grain in not less than three inches in depth. This grain is perhaps the most successful grain crop that Southern Alberta produces. Winter killing is rare. In fact, with deep and early seeding, it is almost entirely eliminated.

Winter Wheat is nearly always sown on summer-fallowed land, but may be put in on land broken deep in the early summer and thoroughly disced before seeding. The finer the seed bed is pulverized, the more certain the farmer is of good returns. Quantity of seed per acre, the same as Spring Wheat.

**Oats.**—There used to be considerable diversity of opinion as to the merits of putting in oats prior to the first of May. It is, however, pretty well acknowledged now that early seeding of oats is good practice. This cereal is a fairly early ripener. The number of days of maturity range from 110 to 118. It is not, therefore, nearly as essential to sow oats early as, for instance, spring wheat. Generally, oats put in before the 10th of May is a safe proposition. Quantity of seed per acre, two and one-half bushels.

**Barley, Two-Rowed.**—The demand for irrigated two-rowed barley is almost inexhaustible, and this crop will, therefore, ultimately become one of the most valuable in the Irrigation Block. The only variety to sow is

the Gallatin Valley barley, which is a variety of the Chevalier. If this can be obtained Alberta grown, it will do better than the imported barley. Two-rowed barley is somewhat later of maturity than the six-rowed variety, and should, therefore, be sown fairly early. It would be well to have two-rowed barley in the ground before the 10th of May. Quantity of seed per acre, two bushels.

**Barley, Six-Rowed.**—This is, perhaps, the earliest maturing cereal produced in Alberta, but should be sown prior to the 15th of May. The average period of maturity is about 97 days. If sown on summer-fallowed land, maturity is generally delayed four or five days. The best time of sowing is as near the 10th of May as possible, or earlier if the season justifies it. Quantity of seed per acre, two bushels.

**Field Peas.**—Peas intended for ripening require 110 to 112 days for maturing, and should be sown as early as possible. They make a very paying crop on irrigated land. Quantity per acre under irrigation would be two bushels of the small variety and three and one-half bushels of the large varieties. The smaller varieties are generally preferred. Peas should never be broadcasted, but should be drilled in deeply. This is of great importance. If peas are to be sown on newly-broken land and a press drill is not available, the seed may be disced in, but this plan is not recommended. Before the seed appears above the ground, a light harrowing is recommended.

**Flax.**—This is an early ripening crop, taking about 102 days to mature. It may be sown any time after the 5th of May and as late as the 20th of May. The quantity of seed per acre that has given best results is thirty pounds.

Flax is the settler's safest spring crop on newly broken land. It will respond to the crudest methods of cultivation and give fair results, and will get along nicely without an abundance of moisture. Many farmers have added a considerable amount to their capital by growing flax as the first crop on their land, as the price is generally good.

**Potatoes.**—The common practice in Alberta is to put in potatoes during the second week in May. They are generally sown at the rate of eight bushels per acre. Potatoes will be one of the main crops of the Irrigation Block, as maturity can be hurried by the judicious application of water at certain stages of the growth. The best potatoes are invariably grown under irrigation.

**Turnips.**—Cut worms are at times troublesome on early seeded turnip plants, and it is, therefore, good practice to delay seeding until the last week in May or the early part of the month of June. Early seeding is not so essential, as the turnip goes on developing for several weeks after killing frosts have made their appearance.

**Alfalfa.**—The quantity of seed per acre for this "King of Forage Plants" is about twenty pounds on non-irrigated lands in Southern Alberta. On irrigated lands seventeen pounds will generally be sufficient. It has not been demonstrated that alfalfa can be grown as a perennial without irrigation. From the middle to the last of May is the best time to sow, although early June sowing has been fairly satisfactory. The usual method of sowing alfalfa south of the line is with a nurse crop, but it has been found better in Alberta to sow it alone. Northern grown seed should be

obtained if possible. Alfalfa should not be sown until the land has been under cultivation at least a sufficient time to insure the wild grasses being killed out completely. The ideal condition of soil would be land on which potatoes or other hoed crops have been grown the previous year, or summer-fallowed lands harrowed down smoothly.

A bulletin issued by the Dominion Experimental Farm for Southern Alberta, written by Prof F. W. Fairfield, Superintendent, will be supplied upon application to the Company's office at Calgary. This publication gives full information on the subject, and should be in the hands of every colonist on the Irrigation Block who is interested in alfalfa.

**Sugar Beets.**—It is considered good practice to sow sugar beets during the second week in May. The quantity of seed per acre is 15 to 17 pounds. The Company has at its Demonstration Farm beet drills available, which may be used by new settlers, providing arrangements can be made to spare the drills at the time they require them.

No industry lends itself more readily to profitable development under irrigation in Southern Alberta than sugar beet growing. The Canadian Pacific Railway has arranged to reduce its transportation charges on beets from points in the Irrigation Block, east of Calgary, to the nearest sugar factory, located some 200 miles from that city. The Provincial Government pays a bonus on beets through the sugar companies, and other interests also contribute toward the rapid development of this valuable industry. The result is that the net price paid to farmers for sugar beets at the nearest railway station in the Irrigation Block is approximately \$5.00 per ton f.o.b. cars. The average price paid for beets for the whole of the United States, according to the last census, was only \$4.18 per ton. In the State of Minnesota a minimum price of \$4.25 per ton has been established by law. The price paid for beets in Utah, one of the foremost of beet growing states, was \$4.25 a ton, with an average yield of 11.4 tons an acre.

**Timothy.**—This makes a splendid hay crop under irrigation. It is generally sown with a nurse crop, if possible, barley. The best results have been obtained by drilling in one and one-half bushels of barley per acre, and broadcasting the timothy crosswise, afterwards giving it a stroke with the drag harrows, preferably with the teeth somewhat slanting. It may be sown immediately after the grain crop, while the soil is moist. The wheelbarrow seed sower may be profitably used where the farmer is not experienced in broadcasting by hand. Seeding timothy by a drill mixed with other grain is not a good practice, as it is generally buried too deep and makes little or no hay the second year. Good results would generally be obtained by sowing between 10 and 12 pounds. On irrigated land the seeding may be somewhat heavier than on non-irrigated land. Some authorities recommend sowing as much as 30 pounds per acre, which, however, would be excessive; 12 to 15 pounds would perhaps be sufficient for irrigated land.

**Bromus Inermis, or Awnless Brome Grass.**—This grass has been very extensively grown in Western Canada and the United States, particularly in districts where the rainfall was somewhat scant. For the production of hay on non-irrigable land, brome grass, as it is commonly called, gives very good results. There are, however, serious objections to this grass, namely, the difficulty of killing it out and its tendency to spread. It grows with

running root stalks, the same as couch grass and sweet grass, which are regarded as very bad weeds, almost impossible to eradicate. While this objection is not so very great on non-irrigable land, the Company does not counsel the production of brome grass on irrigated lands owing to the danger that exists of seeding down the irrigation tract to this grass by means of the flowing water. Furthermore, there is no necessity for producing brome grass on irrigated land, as more valuable fodder crops can be grown in profusion, and there is, therefore, no object in running the risk.

Where brome grass fields on non-irrigable lands require renewing, a simple method of doing so is to plow the land shallow and roll it, when profuse growth will again take place until such time as the roots get matted and require renewing. A stroke of the disc harrow has in some cases been found sufficient. While the merits of brome grass cannot be disputed, it is not good farm practice ever to introduce a crop that cannot be readily eradicated.

**Western Rye Grass.**—This grass produces quite as heavy crops as brome grass and can readily be eradicated when desired. It is, like timothy and brome, a perennial, and, properly speaking, a bunch grass. In fact, it is a native of Alberta, and is found in profusion on the bunch grass ranges. This is one of the hardiest grasses, and is suitable for either irrigated or non-irrigated land. It should be sown with a nurse crop at the rate of about 15 pounds of seed per acre, in the same manner as timothy.

### Treatment for Smut.

The best farmers in Southern Alberta invariably treat winter and spring wheat, oats and barley, against smut, as a precautionary measure. Investigation has proven that the bluestone treatment is the most effective for wheat, and the formalin for oats and barley.

Even a small quantity of smut in a load of grain reduces its value greatly and prevents ready sale. The preventative treatment is quite simple and should not be neglected. Bluestone has been largely used for wheat with satisfactory results, and formalin is highly recommended for use on all grains, but care should be taken that the latter chemical is of the standard 40 per cent. strength.

Dissolve one and a half pounds of bluestone (copper sulphate) in hot water and add water to the extent of 50 or 60 gallons. The solution may be placed in a coal oil barrel and the wheat dipped in this, or the wheat may be placed on the granary floor and merely sprinkled and mixed, turning it over with a shovel so that it be all thoroughly dampened.

Formalin solution (40 per cent.) is used at a strength of 4½ ounces to 10 gallons of water, it being sufficient in the case of wheat to dip or sprinkle, but oats require to be soaked from 5 to 10 minutes. Grain should not be left in a pile to heat after being treated, but should be sown within a few hours or spread to dry.

Don't forget to make allowance, in setting the seeder, for the swollen condition of the grain, or you will be sowing less per acre than you intend.

A special publication dealing with the treatment of grain for smut will be supplied colonists within the Irrigation Block upon application to the

Company's Offices at Calgary. We would direct special attention to this matter, and would strongly caution farmers against sowing any grain without prior treatment.

## **Weeds.**

A few remarks have already been made in regard to the importance of not using seed grain containing seeds of noxious weeds. Owing to the unparalleled fertility of Southern Alberta lands, it is marvellous how quickly weeds obtain a foothold and how difficult it is to thoroughly eradicate them without continuous summer fallowing and hand picking. It is, therefore, of the utmost importance that every settler should be able to identify weeds that are likely to give him trouble in order that he may take steps to get rid of unwelcome guests of that sort before they have an opportunity of over-running his farm. The Company has made arrangements with the Provincial Department of Agriculture for supplying each colonist on the Company's lands with a copy of a bulletin dealing specifically with the question of weeds, and containing illustrations of those that are liable to become troublesome. This can be obtained by application to the Company's Offices at Calgary, and should be in the hands of every settler before he starts operations on his land.

The bulletin in question will also give certain information regarding the administration of the "Noxious Weed Act." The Government exercises close supervision over growing crops all through the Province. A large corps of inspectors devote their entire time to looking over growing crops at a season of the year when steps can be taken to cope with the weed pest. These men will give settlers advice and assistance, and where a farmer fails to carry out the inspector's directions, he is liable to a fine or his crop may be ordered cut before the weeds have an opportunity to develop seed.

## **Gophers.**

A considerable amount of loss is annually sustained by farmers in some districts through the destruction of growing crops by gophers. On irrigated farms they can readily be coped with, as irrigation will drown them out. On the non-irrigated land they are, however, liable to be troublesome, and may also commit damage on adjoining irrigated land, particularly on alfalfa meadows. It is, therefore, a public duty resting on the shoulders of every settler to destroy gophers on his own lands, and in some cases even on adjoining unoccupied lands.

While on this subject it might be mentioned that hawks are of the greatest possible assistance in keeping down gophers, and they should not, therefore, be shot. Only a very few of the varieties of hawks prevalent in Southern Alberta interfere with the farm fowls, and the loss from that source is a mere trifle.

An easy way of destroying gophers is by means of poisoned grain. Take three-quarters of an ounce of strychnine sulphate and dissolve it in a pint of hot water; add one pint of molasses and a teaspoonful of oil of anise. Thoroughly heat and mix the liquid. While hot, pour it over half a bushel of clean wheat and mix in a tight vessel. Put in a little wet flour

to take up the moisture and make the poison adhere to the grain. Let it stand over night, and the following morning arm your wife and children or friends with a sufficient quantity of the poisoned grain in old tins of some sort and simply walk all over the farm, and, if necessary, outside of the farm, and place a few grains inside every gopher hole. This should be done before the grass becomes green, as once there is good pasture available, the gophers will frequently leave the grain untouched. Poisoning as indicated is the only effective way of getting rid of gophers.

### Tree Planting.

If there is one feature more than any other that appeals to the average person travelling through an irrigated section, it is the profusion of trees that may invariably be found there. Under irrigation there is no limit to the amount of tree planting that can be successfully carried on. Even without irrigation, on thoroughly prepared and summer-fallowed land, good success is met with in planting the native trees of Alberta.

In order to encourage the planting of trees on the plains, the Dominion Department of the Interior some years ago established a Forestry Department at Ottawa, and obtained the services of a number of technically qualified men. A large amount of money was then appropriated for supplying settlers in Western Canada with trees free of charge. The Government established a large tree plantation in connection with the Experimental Farm at Indian Head, Saskatchewan, and the policy has worked out eminently successfully. All settlers on the Irrigation Block who wish to go in for a tree plantation on their farms should apply to the "Dominion Superintendent of Forestry, Department of the Interior, Ottawa, Ontario," when full information will be sent them with the necessary blank forms of application. Owing to the fact that the demands upon the Department have been so heavy, it is necessary that early application be made. Tree planting applications received during the Spring of one year, can seldom be filled until the following year. The Dominion Government in the meanwhile send an experienced forester to your farm who will discuss the whole situation with you, and will make a sketch of the proper places to put in the trees and give complete directions as to preparing the land and the manner of planting. When the proper time comes the trees will be sent you free and with all express charges paid, so that you are under no actual expense whatever in getting your plantation started.

With such a favorable arrangement available there is absolutely no excuse for the absence of trees on any farm in Western Canada, and, furthermore, where irrigation is available it almost becomes a crime not to have a tree plantation started at the earliest possible moment. Tree plantations under irrigation have reached a growth of fifteen feet during the first three or four years in Southern Alberta, and every colonist owes it not alone to himself and his family, but also as a public duty, to place himself in communication with the Dominion Forestry Department at the earliest possible moment, even before he has his land broken, and make all arrangements for starting a tree plantation as soon as he is in a position to provide land cultivated in accordance with the directions of the Dominion Government.

## Fruit Trees.

Standard apples, crab apples and plums have been produced in nearly every portion of the Province of Alberta. It is, however, most desirable that before attempting to produce large fruit an effort should be made to get a forest plantation and shelter belt started in order to provide the necessary protection from the winds that prevail on the treeless plains. With the judicious application of water no reason exists why these fruits should not be profitably and plentifully produced in Southern Alberta.

The varieties of crabs that have proved most successful are the "Transcendent" and the "Siberian." The most successful standard apple is, perhaps, the "Duchess of Oldenburg" and the "Patten's Greening." The Manitoba Wild Plum produces plentifully, but is not of a very high quality. It is very essential in sending for fruit trees to insure that these trees have been grown in Western Canada. Nurseries have been established at Virden and Brandon in the Province of Manitoba, and all the requirements of farmers in the Irrigation Block can be met from there.

## Small Fruits.

There is not the slightest difficulty in producing almost all varieties of small fruits. White, red and black currants grow profusely, and raspberries give good returns, particularly when bent down in the fall of the year and covered with straw or other litter. Gooseberries have also proven satisfactory. Under irrigation small fruits of the finest quality have been produced in Southern Alberta for years, and there are also a large number of orchards where raspberries and currants are produced on non-irrigated land. Strawberries grow well under irrigation. They are somewhat later than those produced in the east or south of the line, but the berries are of excellent flavor and size.

## Dry Land Farming.

While this Company is chiefly interested in the sale of irrigated lands, it is not by any means asserted that the non-irrigated, or as they are sometimes called, "dry" lands, of Southern Alberta are not most productive in regard to the ordinary cereal crops and certain large deep-rooting grasses that do not require a large quantity of moisture.

It may be at once asserted that to farm successfully on non-irrigated lands, not alone in Southern Alberta, but in the southerly portions of the Provinces of Manitoba and Saskatchewan, it must be done on summer-fallowed land. The best farmers in the famous Indian Head district conduct their farming operations almost entirely on land that has been fallowed the preceding year. This is also the case on the great winter wheat farms of Washington, Oregon and Idaho.

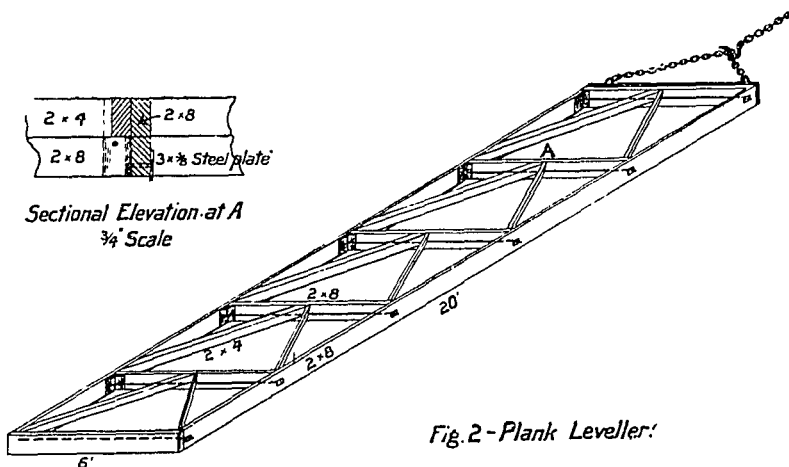
The tendency of modern agricultural investigation in the American West has undoubtedly been chiefly to introduce crops and systems of culture that will produce the best results with the most limited quantity of moisture. The aim and object of modern methods of cultivation is essentially the preservation of soil moisture. Colonists starting in on non-irrigated farms within the Irrigation Block should recognize the fact, that the most suc-

cessful results will invariably be obtained on lands summer-fallowed as early in the season as possible, and then followed by vigorous harrowing, especially after the occurrence of showers. The great crop on Southern Alberta non-irrigated lands is winter wheat, which lends itself particularly well to the introduction of the summer-fallow principle.

An excellent book has been written by Professor Campbell, of Nebraska, on the "Campbell System of Dry Land Farming." This book can be obtained through any bookseller in Calgary, and it would be a good investment for all those who propose following farming on non-irrigated land exclusively, to obtain a copy of this publication, which fully explains the special implements and systems of cultivation that experience has taught will give the best results in the way of moisture preservation.

## Irrigation and Drainage.

Good drainage is essential for permanent productive irrigated farming. It is recognized to be a practical impossibility to supply just a sufficient quantity of water, and no more, for the production of crops, and it is, therefore, necessary that means should be adopted for the draining off of the superfluous quantity of moisture. Unless this can be done, it will have a



tendency to raise the level of the ground water until it comes to the surface, where it will cause an accumulation of alkali and will drown out the crops. Too much stress cannot be laid on the absolute necessity of good drainage for the irrigated field.

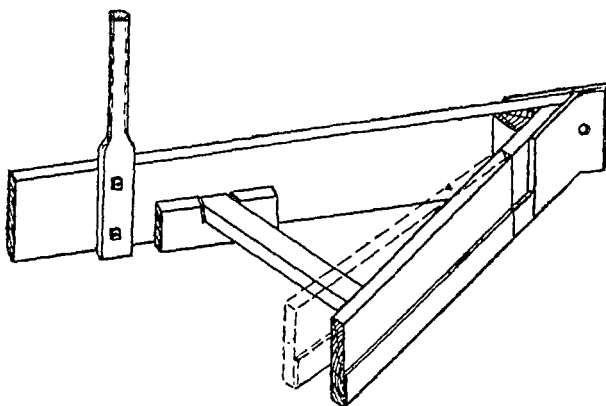
Easily irrigated soils will absorb sufficient water in 24 hours to become moist to a depth of two to three feet. Much depends, of course, upon the sub-soil conditions. Where land is underlaid with a sandy or a porous clay, a greater quantity of water can be applied with impunity than where the sub-soil is impervious.

The first step to take after the land has been broken and cultivated ready for the seed, is to level it. This may be done by means of a plank leveller that can readily be made at home at a cost of a few dollars. Figure 2 shows the detail of construction.

The best conditions for irrigation are a smooth surface with a uniform slope of from ten to twenty feet per mile. Such lands cost little to put in shape for the application of water, and the slope insures good drainage. Land with buffalo wallows will require to be carefully levelled before the crop is put in.

### Farm Ditches.

The Company undertakes to deliver the water at the highest point on the farm, and the settler will himself provide for the distribution within the boundaries of his holding. These ditches can be readily constructed by the farmer himself. The first step necessary is to ascertain the location of the main distributaries. The Company maintains an engineering staff that will be available to lay out a proper distributary system on every irrigated farm within the Block. Applications for the services of an engineer for that purpose should be made either to the ditch riders employed by the Company, or at the various engineering headquarters within the Block. When the location of the ditch has been made on the ground, the surface, if on unbroken land, should be broken and the sods removed by hand and piled up along the edges of the ditch as directed by the engineer. The ground below may then be plowed and a team hitched to a home-made "V" scraper or crowder constructed as indicated in Figure 3.



*Fig.3-Adjustable "V" Scraper or Crowder.*

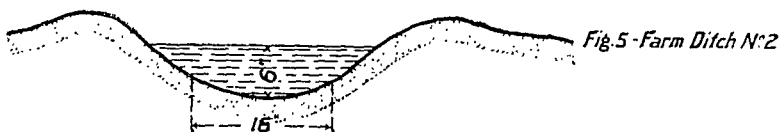
This implement will remove the loose soil and pile it on both sides of the ditch. Figures 4, 5, 6 and 7 illustrate the manner of constructing the various styles of ditches.

### Structures.

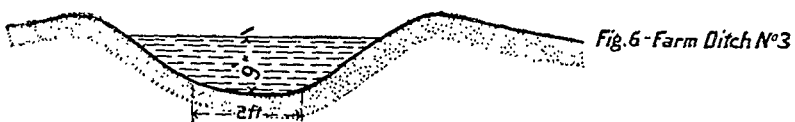
The headgate that controls the flow of water from the Company's supply ditch to each farm is constructed by the Company at the expense of the farmer, and is absolutely under the control of the Company.



*Fig. 4 - Farm Ditch N° 1*



*Fig. 5 - Farm Ditch N° 2*

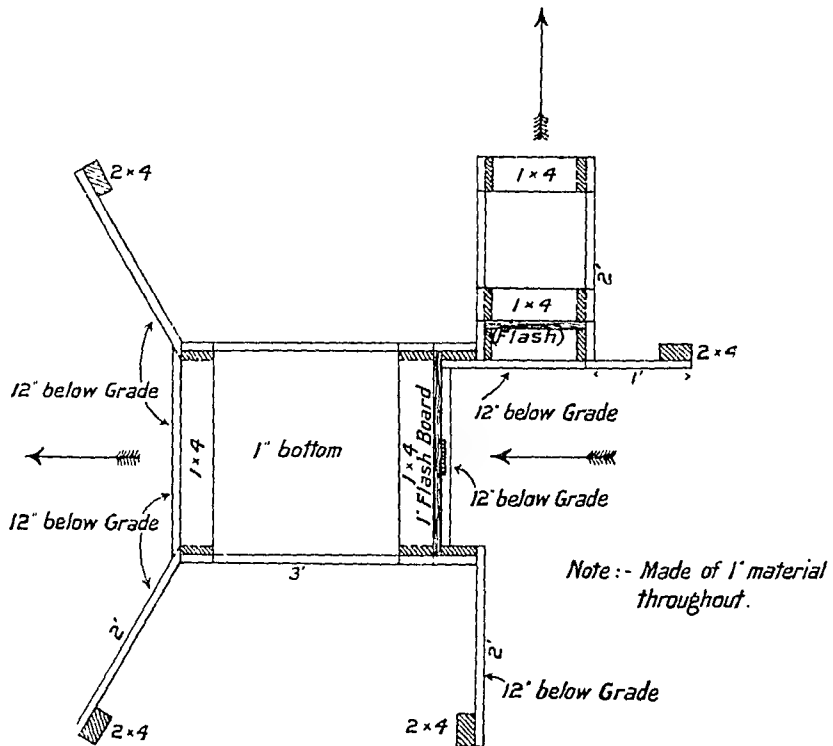


*Fig. 6 - Farm Ditch N° 3*



*Fig. 7 - Section of small raised ditch.*

In addition to this structure it becomes necessary for the farmer to have at various points along his main distributary similar gates, but not necessarily on as large a scale, to control the water supply of his system of laterals. Figure 8 illustrates the manner of constructing these farm gates economically and efficiently.



*Fig. 8 - Farm Gates.*

### Method of Applying Water.

Farm ditches are built with a certain grade, depending upon the quantity of water to be carried and upon the nature of the soil. They are generally so constructed that water will run at a velocity of one foot per second. When an obstruction is placed in such a ditch it is evident that the water will overflow and escape on the land, and this is the principle adopted. A small dam made of earth or a "canvas dam," is placed in the ditch, and the water consequently overflows upon the land. When sufficient water has escaped to moisten the land tributary to that section of the lateral, a dam is placed some distance below the first dam, which is then removed. This causes the ditch to overflow further down, and this method is followed until the entire field has been covered by flooding.

## Irrigating Alfalfa and Grass Meadows.

Permanent crops are most commonly irrigated by being flooded from field laterals. Immediately after sowing the crop the various laterals are laid out in such a way that they will impede as little as possible the progress of the mowing machine at the time of harvest. The material taken out of the laterals should be, as far as possible, spread over the surface, and the laterals should be constructed wide and with an easy slope to both sides. It will pay farmers to exercise special care in providing the most perfect system of distribution in cases of that sort, as it need not be disturbed for several years, and will materially facilitate not alone the application of water, but also the operation of farm implements.

It would be well to have the soil in fairly moist condition before the seed is applied, and the application of water should be avoided during the very early stages of the growth. Early irrigation causes the roots to branch out near the surface and to depend for food and moisture upon the top layers of soil, which are subject to extremes of droughth and moisture. If the soil is fairly moist at the time of seeding and the surface in good condition to retain the moisture, there will be no need of applying water until the crop shades the ground. Even though the crop should suffer slightly from lack of moisture, it will, as far as alfalfa is concerned, be better to withhold water, so as to force the plant to extend its tap root as far as possible into the sub-soil in an effort to hunt for moisture from beneath.

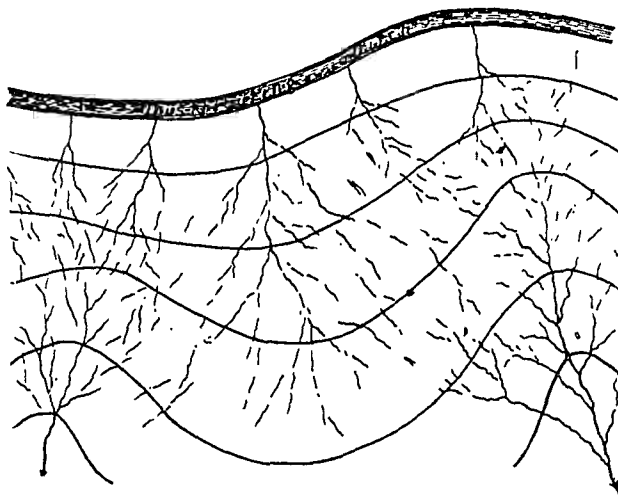
In irrigating fodder crops, it is well to keep the field laterals from 20 to 25 rods apart on a grade of three to four inches for each 100 feet. One irrigator can frequently attend to two streams which are kept running in adjacent laterals. The water is allowed to run until the upper foot of the soil is saturated, and any excess that runs off will be caught by the lower lateral. By this method one man can, without effort, irrigate up to five acres in a day.

Considerable economy in time has followed the use of laterals constructed somewhat on the funnel principle, which overflow automatically on letting in the water. These laterals should be about two feet in width at the head, gradually tapering to a point at the end, and should be located from 20 to 30 rods apart. When a sufficient head of water is forced into such a lateral it will irrigate a large area with little or no attention. In fact, one man can readily attend satisfactorily to from two to three hundred acres of alfalfa or other meadow irrigation.

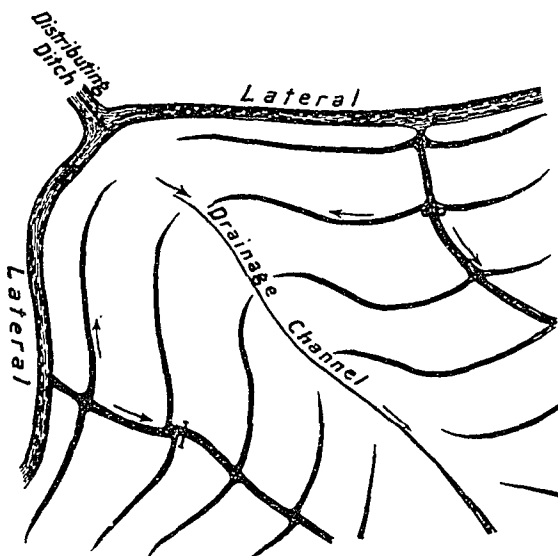
These tapering laterals can be very cheaply made by using an adjustable double mould-board plough, specially made for the purpose.

It is usual to cut irrigated alfalfa more than once in the season, and in Southern Alberta it will frequently be found that there will be sufficient moisture in the ground to produce the first crop without the aid of artificial moisture. Each subsequent crop is irrigated once, as a rule, and opinions differ somewhat as to the proper time to irrigate. In the Yellowstone Valley in Montana, where conditions are very much similar to what they are in Alberta, the custom is to irrigate for the second crop before the first crop is cut. A week or ten days in advance of the time when the alfalfa will be ready to cut, the water is turned in. Judgment will, of course, have to be used in applying water in advance of cutting to insure that when the

crop is ready for cutting, the land is in good condition to work the mowing machine and do the hauling.



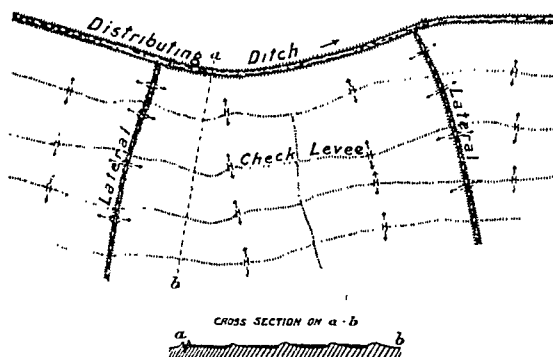
*Fig. 9 - Wild Flooding.*



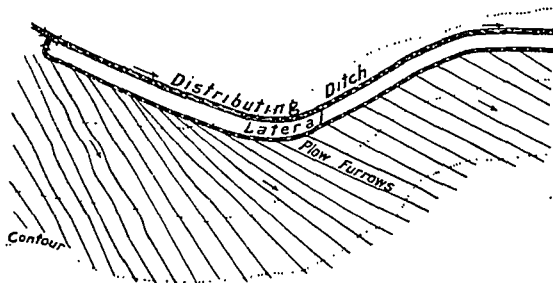
*Fig. 10 - Distribution on rolling land*

Figures 9, 10, 11, 12 and 13 illustrate various methods of distributing the water on the land.

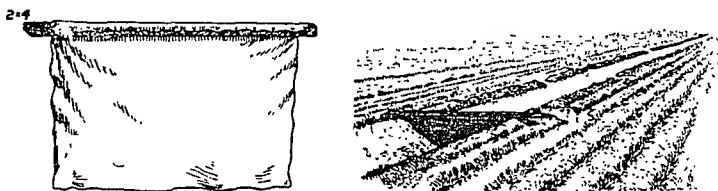
Figure 14 shows a furrower, which may be easily and cheaply made by the farmer himself.



*Fig.11-Irrigation by system of check levees.*



*Fig.12-Furrow Irrigation.*



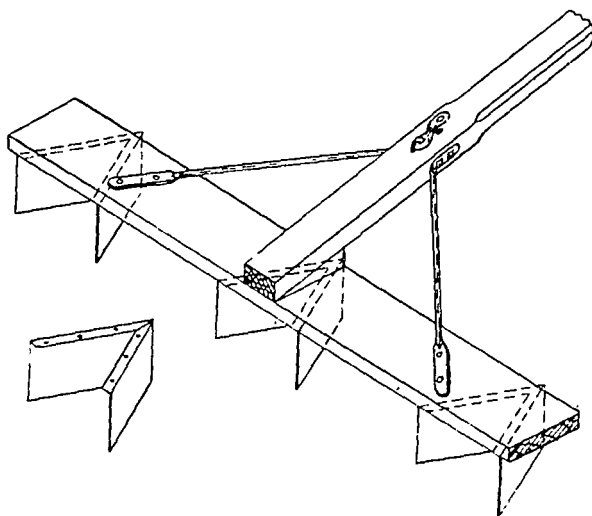
*Fig.13-Canvas dam and water turned from furrow by same.*

### Irrigation of Cereal Crops.

Grain fields are generally irrigated by field flooding from laterals. It will invariably pay to irrigate grain crops where the area has been seeded down to alfalfa or any other perennial forage crop, and in very dry years there can be no question that the irrigation of grain crops of any sort will

be a paying practice. It is, however, a question whether it will pay to irrigate winter wheat unless the season proves extremely dry. The irrigation of oats will generally be followed by good results, and the same holds good in regard to barley. For the production of a green crop for feeding, there can be no question but that irrigation will be profitable almost irrespective of how wet the season may prove to be.

As soon after seeding as possible field laterals are run out uniform in width throughout their entire length. These extend from the head gates of the main ditch and are placed from sixty to seventy feet apart. If the surface has been well prepared, a grade of  $1\frac{1}{2}$  inches to the rod will be ample for the laterals. No fixed rule can be laid down for the proper time to irrigate grain. The soil should contain sufficient moisture at seed time to nourish the crop until it shades the ground. A quantity of water, varying from five to eight inches in depth, may be applied at one irrigation at that time. A second irrigation is usually applied when the grain is beginning to head out. The plants are using at this time the maximum amount of



*Fig. 14-Furrower*

moisture, and as soon as there is a deficiency they begin to suffer. When the growth is checked at this stage, lost vigor cannot be restored by the subsequent watering, and the yield is lessened. No water should be applied during the last three weeks of growth, so as to induce the plant to mature before the advent of killing frosts. After the last irrigation has been applied, the banks of the field laterals should be turned back into the lateral by a walking plow drawn by one horse, so as to permit of a self-binder being operated in the field.

Great care must be exercised in irrigating grain. Unless the crop has been somewhat thickly seeded the application of too much moisture is liable to induce too great stooling and individual development of the straw and heads, thus delaying the ripening process to the danger limit. If the

season is reasonably wet, it may be only necessary to apply one irrigation, which should generally be at the time the grain is heading out, and if at that time the straw is long and heads well-formed, and the plant does not appear to be suffering in the least from lack of moisture, it might be better practice to omit irrigation entirely. The above remarks, of course, only hold good in respect to grain crops that are required to mature. It will scarcely be possible to apply too much water within reasonable limits to green crops, particularly if the weather is inclined to be hot.

**Field Peas.**—Very little data is available in regard to the proper handling of field peas under irrigation in Southern Alberta. This crop may be planted either for grain or for forage. If grown for forage, field peas are generally sown as directed in the preceding pages, and after seeding, a bushel of oats per acre is broadcasted and harrowed in. The oats tend to facilitate harvesting and also induces longer growth of vine.

It is generally best to irrigate when the peas are in blossom and again when they are past the bolling stage. When the peas are green enough to dry and hold the grain, they are cut with a mowing machine, throwing each swath out of the way. If grown for hay, the ground should scarcely be allowed to dry to any extent. Some years it will take four or five irrigations, while other years three may be found sufficient.

Certain investigations have been carried on at high altitudes in Wyoming, under the auspices of the State Experimental Station, regarding the irrigation of field peas. Of six fields, other conditions being the same, the highest yield for field peas for forage was 4.2 tons per acre, obtained with the use of water to a depth of nearly 23 inches applied in seven irrigations. The highest yield of peas, namely 34.75 bushels per acre, was obtained when about 20 inches of water in depth had been applied in four irrigations. The yield was decreased when either more or less water was used. It is concluded that a depth of a little under 20 inches of water will give best results for field peas. It should be noted that each irrigation delays the maturity of peas. It is questionable whether more than four irrigations would be advisable in Southern Alberta. The intelligent farmer will, of course, to some extent consult the texture of his sub-soil and the natural rainfall, and increase or decrease the water accordingly.

Field peas is an exceedingly profitable crop under irrigation. A net profit of \$50 per acre is easily possible under the best methods of irrigation, raising seed for market, when the market price amounts to about 3c. per pound. Pea vine forage is very highly esteemed, and should readily sell at \$10 per ton, which would realize a net profit of between \$25 and \$30 per acre for green crops.

Southern Alberta is just initiating a splendid industry in the production of Field Pea seed under irrigation. This is, at present, the only portion of the continent where peas can be grown without the destructive influence of the pea weevil. Alberta has the opportunity of supplying seed to the rest of America.

### **Irrigation of Root Crops.**

A cardinal principle in root growing under irrigation is to follow, as soon as the soil will permit, with surface cultivation. This cannot be too strongly impressed upon those who are not experienced irrigators. It is

the best practice in irrigation farming to use water sparingly and to introduce every effort in cultivation to preserve the moisture supplied.

Root crops are irrigated by furrows made midway between rows. These furrows should not be more than 500 feet long, and in light, sandy soil with little fall this distance should be reduced. Short furrows insure a more even distribution of water, and frequently prevent injury to the crop by water-logging the soil near the lateral.

**Potatoes.**—In Colorado the common practice in raising potatoes is to grow alfalfa for two years and then to plant the ground for potatoes for two years, and at the beginning of the fifth year sow to wheat. In turning down alfalfa in the spring before planting the potatoes, the field should be irrigated and afterwards plowed from 6 to 8 inches deep when the soil is dry enough to crumble up into small particles as it falls from the plow mould-board.

Some farmers prefer to take off a grain crop after alfalfa so as to thoroughly eradicate the latter from the soil before planting to potatoes, as in cases where the alfalfa is not completely killed out it proves very troublesome amongst the potatoes, and a great deal of hand labor is required to keep the potatoes clean. Alfalfa will probably prove difficult to kill out in Southern Alberta, and a grain crop before potatoes is, therefore, recommended.

Potatoes require the most careful treatment. The ground intended for an irrigated crop should be smooth, having sufficient slope to make the water run freely between the rows; 7 to 10 feet to the mile gives good results. It should be dragged until the soil is firm throughout and thoroughly pulverized in the surface. The ground should be laid off in rows  $3\frac{1}{2}$  feet apart with a marker. If the early Ohio, which grows the smallest vine of any variety, be used, it is advisable to plant the potatoes 10 inches apart in the row. Varieties producing larger vines should be placed at a greater distance. The closer you have the rows together and yet being able to cultivate with a single horse, the better will probably be the result, as it is essential that the ground should be protected to the greatest possible extent by the vines in order that the moisture may not evaporate too quickly after irrigation on hot days, as the potato is a plant that does best in a cool, moist soil. The practice is quite prevalent of giving the ground a good soaking prior to putting in the seed.

When the sprouts appear above the ground they should be promptly harrowed so as to preserve the moisture and kill the weeds. It is a very difficult matter to lay down any directions that would be applicable in all cases in regard to the proper handling of water upon a potato crop. It may, however, be stated that it is generally vastly better to allow the potato vines to attain a considerable growth before water is applied. If the ground should turn very hot and dry and the vines should show signs of ceasing to grow, water becomes a necessity irrespective of the season, unless the crop is very near maturity.

If the spring has been cold and backward and the sub-soil is still lacking in warmth, it will be found fatal to the potato plant to apply water, even if the soil is abnormally dry. In an average season in Southern Alberta, one irrigation should mature a crop of potatoes, but if the growth of vines is heavy and shades the ground well, two or even three waterings will increase the yield and will not injure the tuber.

As previously stated, each application of water should be followed as soon as possible with a thorough cultivation until the vines are too large or the tubers too near the ground to permit of it. As a rule, it is best not to have rows over 40 rods in length. If the ground is very steep, of course, the water will run through quickly, but it will have to run longer than in a row with less fall, to give it time to soak in.

After once irrigating a crop of potatoes, it is very important that the ground should never be allowed to become too dry, thus stopping the growth of the potato. If this is permitted, and by irrigation the potato again starts to grow, it will either increase irregularly in size or set a second crop, thus giving a large number of small or ill-shaped potatoes. Irrigation should generally be discontinued about the latter part of August, although if the autumn is extremely dry, a light irrigation later on may be made.

The most experienced potato growers in America reside in the Greeley colony, in Colorado. The practice there is, never to irrigate potatoes until after the young tubers are set. The reason for this is obvious. When irrigated immediately before setting, a greater number of potatoes will be formed than the plant can support, and consequently only a few of them grow large enough to be marketable. When tubers are allowed to form first and are irrigated afterwards, fewer potatoes will form on each hill, but a large crop of marketable tubers is the result.

It should be borne in mind that water should be most carefully handled on potatoes and should never reach the crown or stem of the plants. It is the roots and not the tubers that are to be watered, and the roots will extend some considerable distance towards the middle of the row while the tubers are yet small. It has been found that where manure is applied to potatoes, a greater quantity of water can with safety be used; in fact, is necessary, otherwise the manure will have a tendency to burn the tubers and produce fungus growth. In irrigating potatoes, a great deal depends upon the lay of the land and the facilities with which it can be drained. With a porous sub-soil and a good slope, a much larger quantity of water can be used than would otherwise be the case, but until the beginner has gained some experience in handling water, it is a safer proposition to use it sparingly, even with a crop like potatoes that can stand more moisture than other root crops.

**Sugar Beets.**—The irrigation of sugar beets is performed in a manner similar to potato irrigation. The greatest of care must be exercised in irrigating this crop, and in order to avoid mistakes, all colonists on the Irrigation Block that decide to grow sugar beets, should keep in close touch with the Company's Demonstration Farms and obtain the advice of the staff maintained there, whose duty it is to give information on the subject.

The seed bed should be thoroughly pulverized before planting. As soon as the ground is warm, the seed should be planted two inches deep and drilled 16 to 24 inches apart. On comparatively new land in the Irrigation Block, it will probably be advisable to provide ample space between rows.

If it should be found necessary in a very dry spring to irrigate in order to germinate the seed, flooding should not under any circumstances be resorted to. Rills should be made between rows and the water allowed to run slowly through them in order to percolate to the seed bed. Up-to-date beet drills have irrigating attachments, and these rills may be made

at the time of seeding. It is a well known axiom that the more cultivation that is devoted to beets the greater will be the sugar contents of the root.

As soon as the beets are all up, and not later than the stage when the beets have thrown out from 4 to 6 leaves, they should be thinned to single plants 4 to 6 inches apart in a row. In very rich and well cultivated soil six inches may be sufficient, but on the new lands of Southern Alberta it will be found advisable to increase the distance somewhat, at least for a couple of years after the land is broken and until it becomes mellow. While the water contents of sugar beets is very considerable, the ability of such a deep rooting plant to obtain moisture from the lower strata of the soil is naturally very considerable, and for that reason less water is required than would suffice for more shallow rooting plants. There cannot be any reasonable doubt that a vast amount of harm may be done by over-irrigating sugar beets. During the Fall particularly, the beet requires a very dry surface soil to increase its saccharine contents, and will generally thrive upon the moisture it has received from the irrigating waters during the summer season. Stop irrigation early, guard carefully against seepage from surrounding crops, and never apply sufficient water to flood the ground.

Sugar beets make an excellent crop for stock feeding, and where required for that purpose, the same care is not as essential as growing them for the sugar factory: in fact, 5 to 7 irrigations during a moderately warm season, would give good results for feeding purposes only.

**Fruit Trees.**—Apple trees should be planted on an average about 28 feet apart: Plum trees about 20 feet apart. The common method of irrigating large fruit trees in Western America is by furrows from 500 to 600 feet in length. The surface should be cultivated after rain and after each irrigation, and, if necessary, during intervals. Young trees should be watered by a furrow on each side of the row. The idea to be kept in mind is to train the roots outwards and down so as to enlarge their feeding zone. The perfect way of watering fruit trees would be to keep the surface as dry as possible and apply the water from beneath. The more closely the irrigator approaches this system by the use of deep furrows, each carrying a small and continuous stream running from two to three days at a time, the more successful he will be.

**Small Fruits.**—These should be irrigated by a small furrow on each side of the row and the soil kept well cultivated after each irrigation. The vines may be cut back after the first year's growth, so as to harden the wood, and during the spring a low, flat ridge should be formed to keep the water from wetting the small vines and fruit.

## Administration of Water.

The duty of water is fixed by the Dominion Government, and the Company is compelled to furnish whatever quantity of water per acre the Government directs. The "duty" as at present fixed, is one cubic foot per second, continuous flow during the irrigating season, for each 150 acres. The Dominion Irrigation Act, under which water is supplied in Alberta, provides that a continuous flow of water shall be furnished during the irrigating season. It is, however, found that a small stream cannot be so profitably handled, and it is, therefore, desirable for any three or four con-

sumers on the same supply lateral to pool their water supply and each use the entire flow for the combined acreage they control for a limited time periodically. The Company will lend every assistance in carrying out such mutual arrangements.

Mail boxes are provided at certain intervals along the ditches and canals, the location of which water consumers will be advised of by the Company. These boxes will be visited each day by the "ditch rider" in charge of the water distribution in each district. At any time water is required, notice must be left two days before the water is required in one of these boxes. Upon receipt of such notification the ditch rider will open and afterwards shut the gates supplying the applicant's farm. These ditch riders are experienced men who have handled the distribution of water in irrigated sections elsewhere. They are instructed to render settlers every assistance and give any advice that may be required in properly handling the water.

It might be here mentioned that the gate in the Company's ditch supplying your farm is absolutely under the control of the Company, and you are strictly prohibited from opening or shutting this gate. The Dominion Irrigation Act and the Criminal Code provide penalties and imprisonment for tampering in any way with these gates.

### Waste of Water.

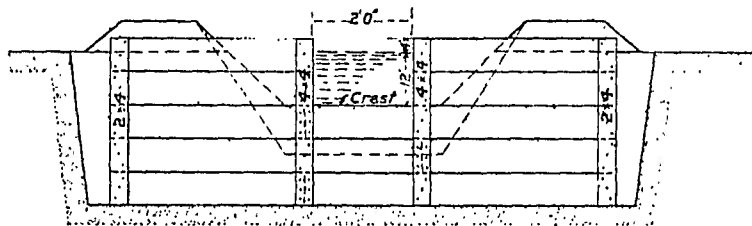
The subject of the **use** of water for irrigation cannot be dismissed without a few words in regard to the **abuse** of water. It is safe to say that more harm than good has been done by inexperienced farmers, who would not listen to advice, by the use of water injudiciously. The fact should never be lost sight of, that there is no royal road to success in any system of farming. Cultivation and soil condition comes first; moisture supply comes only second. It is very tempting to put the seed in the ground, perhaps badly prepared, and trust to irrigation to do the rest. Irrigation never can take the place of cultivation. The two must go hand in hand.

In newly irrigated sections, the sight frequently meets the eye of road allowances and natural depressions being filled with waste water, alkali in quantity being brought to the surface, meadows water-logged and made unproductive, and various other forms of destruction caused entirely by the too liberal or indiscriminate application of water. Thousands of acres have been water-logged and rendered unproductive in the best irrigated districts through wanton carelessness and by men who were supposed to understand irrigation.

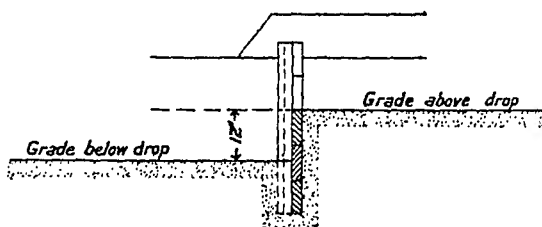
Under the climatic conditions of Southern Alberta, no greater boon could be extended to any intelligent farmer than a sufficient supply of water for irrigation. On the other hand, no more dangerous element could be placed in an ignorant and careless man's hands than an unlimited supply of water. It is, unfortunately, human nature to use indiscreetly that which costs nothing. The fact cannot be too strongly impressed upon colonists on the Company's irrigated lands, that it is absolutely suicidal to use more

water than is essential for maximum results. If in doubt, always use the smaller quantity of water and be on the safe side.

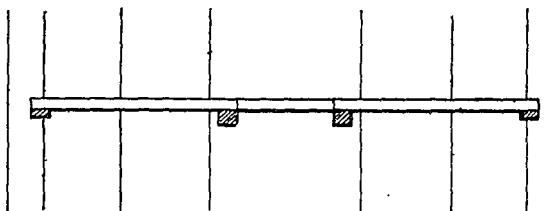
Each ditch rider and member of the Company's Demonstration Farms' staff is expected to be a "guide, philosopher and friend" to the new settler



*Elevation, Down Stream.*



*Longitudinal Section*



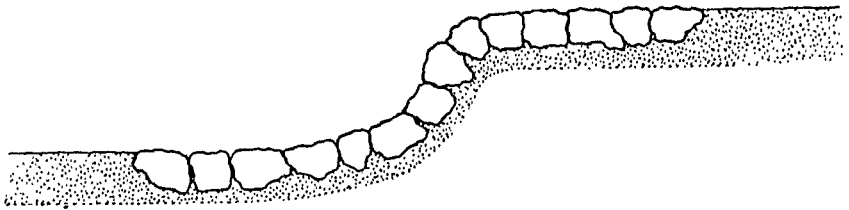
*Plan*

*Fig. 15- Check or Drop .*

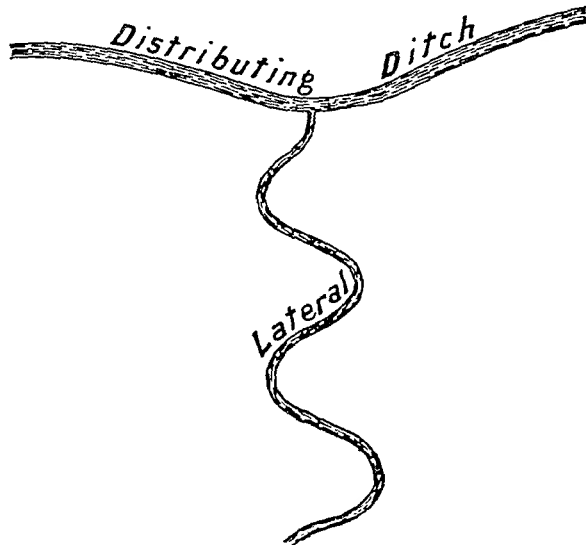
on the Company's Irrigation tract. They are experienced men, selected on account of their ability to instruct and advise. If any farmer makes a failure of irrigation, or abuses the application of water, with such help available, he has only himself to blame.

### Various Structures, etc.

Where the slope of the ground is very steep it may be necessary to take steps to reduce the velocity of the water in the ditches. This may be done by providing drops at suitable intervals, constructed of timber, as



*Fig. 16 - Drop lined with stones.*



*Fig. 17 - Ditch running down steep slope*

shown in Figure 15, or the drop may be formed in the ditch and lined with stones, as shown in Figure 16.

In some cases the velocity may be overcome by causing the laterals to wind about, as shown in Figure 17.

Sometimes it may be necessary to carry the water across a coulee or depression in the ground, in which case flumes may be cheaply and easily constructed, as shown in Figure 18.

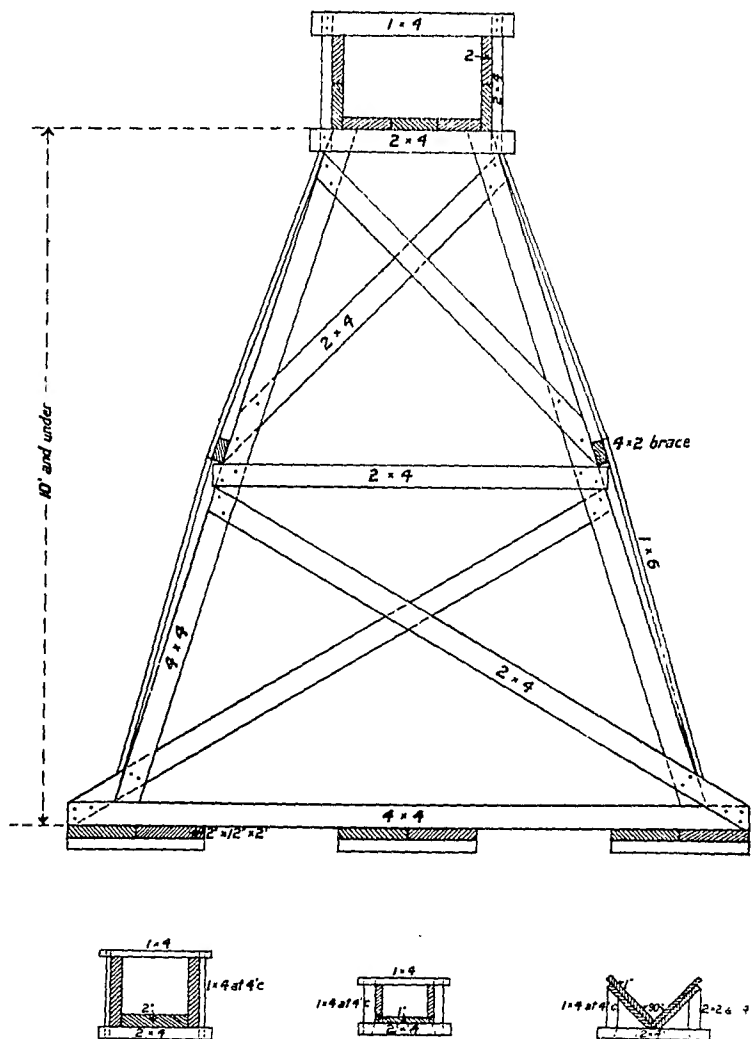
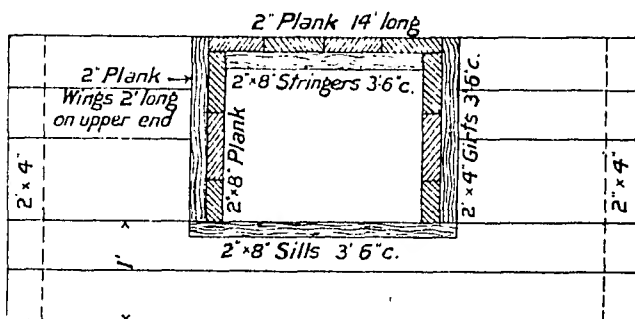


Fig.18 Sections of Flumes.

Figure 19 shows a section through a culvert with plank wings to the upper end.



*Fig. 19 - Box Culvert.*

### Irrigation Literature.

As a great number of those who have purchased irrigated lands within the Company's Irrigation Block are strangers to artificial watering, it would generally pay them to obtain one or two text books on the subject written by practical men. Amongst the best books might be mentioned:—

Irrigation and Drainage, by Prof. King (MacMillan Co.). Price \$1.50.

Irrigation Farming, by Lucius M. Wilcox (The Orange Judd Co.). Price \$1.50.

Primer of Irrigation, by D. H. Anderson (The D. H. Anderson Co., Chicago.). Price \$1.00.